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Smart Protection System for Women Using IOT

Prof. S.R. Kolte[1], Sakshi Zade[2], Sayali Manwar[3] , Surbhi Dhumane[4], Rashi Gupta[5], Snehal Chimote[5]

Department of Computer Science and Engineering,
Priyadarshini J.L. College of Engineering, Nagpur, Maharashtra, India

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Abstract - In the modern world, ensuring women's safety is a crucial issue, particularly with the increasing incidents of harassment and violence. This research paper presents a Smart Women Protection System leveraging IoT technologies. The system is designed to be a compact, wearable device that enables real-time location tracking and emergency alerting. It incorporates an ESP8266 microcontroller, NEO-6M GPS module, GSM module, buzzer, and a 3.3V power supply to ensure timely assistance during distress. The device sends the victim's location to pre-defined contacts and emits a buzzer to attract attention. This paper outlines the system's design, implementation, and potential applications in real-life scenarios.

***Key Words*:** Women safety, IoT, ESP8266, GPS, GSM, Emergency Alert System

1. INTRODUCTION

Women's safety has become a major concern in today's society, with rising incidents of harassment and violence in public and private spaces. Existing solutions like mobile applications or manual alerts are often ineffective in emergencies where immediate action is required. To address this gap, the Smart Protection System for Women proposes an IoT-based device that allows women to send instant distress alerts and location updates to emergency contacts. This system integrates components like the ESP8266 microcontroller, GSM and GPS modules, a buzzer, and a panic button to ensure real-time response and tracking. The device is designed to be compact, cost-effective, and easy to operate, providing a reliable solution for enhancing women's security.

2. LITERATURE SURVEY

The safety of women remains a significant concern across the globe. Technological advancements can play a pivotal role in creating effective safety solutions. This project proposes a smart wearable device that addresses the immediate need for safety during emergencies. By integrating GPS and GSM modules with a WI-Fi-enabled microcontroller, the system ensures real-time location updates and communication, providing a prompt response in critical situations.

3. PROBLEM STATEMENT

There is a growing need for a portable device that not only tracks the user's location but also provides immediate self-defense options in emergencies. Existing solutions are limited to tracking and alerts, which may delay real-time intervention and protection. This project aims to develop an integrated system that ensures quick, automatic activation of safety features when potential danger is detected.

4. OBJECTIVES

The primary objectives of the Smart Protection System for Women project are as follows:

- To develop a portable, user-friendly safety device for women.
- To enable real-time tracking using GPS.
- To send instant SMS alerts with location data via GSM.
- To activate a buzzer for nearby assistance.
- To utilize IoT for enhanced communication and monitoring.

5. METHODOLOGY

The methodology adopted in this project focuses on designing and developing a smart, IoT-enabled, wearable safety device using minimal and efficient electronic components. The system primarily consists of an ESP8266 microcontroller, NEO-6M GPS module, GSM module, buzzer, panic button, and a 3.3V power supply. Below is the step-by-step breakdown of the

Methodology:

5.1. System Architecture

The system architecture is divided into four major functional units:

- **Input Unit**: Panic button
- **Processing Unit**: ESP8266 Wi-Fi microcontroller
- **Communication Unit**: GSM module (SIM800L/SIM900)
- **Location Unit**: NEO-6M GPS module
- **Alert Unit**: Buzzer

5.2. Hardware Components and Their Functions

- **ESP8266 Microcontroller**: Acts as the core processor. It handles signal processing from the panic button and coordinates communication between GPS and GSM modules. It is selected for its compact size, low power consumption, and built-in Wi-Fi capabilities, which can be utilized in future iterations.
- **NEO-6M GPS Module**: Continuously receives satellite signals and tracks the real-time geographic coordinates (latitude and longitude) of the device. Once the panic button is pressed, the current location is fetched and passed to the ESP8266.
- **GSM Module (SIM800L/SIM900)**: Once the ESP8266 receives location data, it formats the message and sends an SOS alert via SMS to preconfigured contacts (family members, emergency services, or the nearest police station) using the GSM module.
- **Panic Button**: A simple press-button switch that acts as a trigger mechanism for the system. Once pressed, it initiates the alert sequence.
- **Buzzer**: Activated simultaneously when the panic button is pressed. It emits a loud sound to attract nearby attention and deter the attacker.
- **3.3V Power Supply**: Ensures stable and safe voltage for all connected components, particularly important for ESP8266 and GPS which operate on 3.3V.

5.3. Working Process

- The user carries the device in their purse, when needed just put in hands.
- Upon sensing a threat, the user presses the panic button.
- The ESP8266 receives the signal and activates:
    - **GPS Module** to fetch current location.
    - **GSM Module** to send an emergency SMS containing the location to saved numbers.
    - **Buzzer** to create noise and draw public attention.
- Optionally, the device can be integrated with a mobile app or cloud platform for tracking or logging past alerts for analysis and law enforcement use.

5.4. Software Integration

- **Embedded C/Arduino IDE** is used for writing the microcontroller code.
- The program is uploaded to the ESP8266 using USB to serial communication.
- AT commands are used to communicate with the GSM module.
- The GPS module is interfaced via UART and decoded using standard GPS libraries.

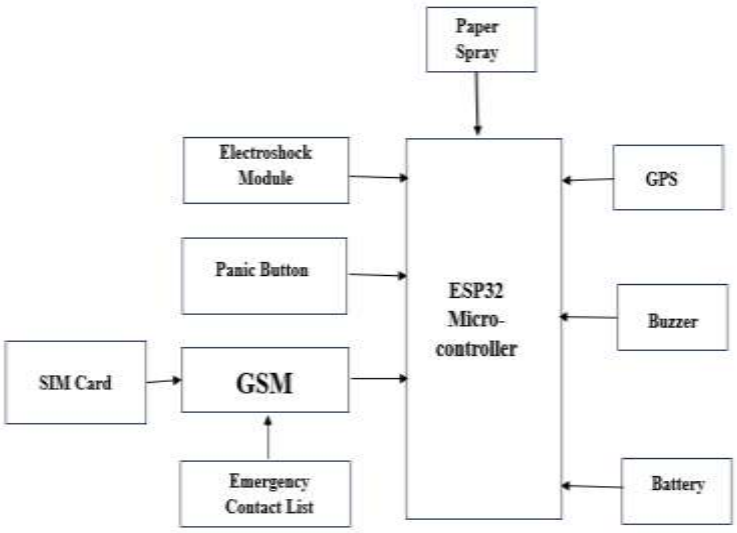
5.5. Testing & Validation

- The device is tested in controlled environments for:
    - GPS accuracy and response time.
    - GSM SMS delivery time and message integrity.
    - Button response and buzzer activation.
    - Power efficiency and uptime.

Field tests were conducted in both open and urban areas to evaluate real-time performance and location accuracy.

6. PROPOSED WORK

The Smart Protection System for Women aims to overcome the limitations of existing devices by offering a comprehensive, IoT-enabled solution for women's safety. It integrates GPS tracking, self-defense mechanisms (pepper spray and electroshock), and real-time communication with emergency contacts. The system's wearable design ensures ease of use, while its priority-based algorithm ensures that critical actions—such as sending alerts and triggering defense tools—are executed promptly in emergencies. Additionally, the system's modular design allows for future enhancements, including AI-powered threat detection and customizable defense options.



7. CONCLUSIONS

The Smart Protection System for Women presents a practical and efficient solution to address the growing concerns surrounding women's safety. By integrating Internet of Things (IoT) technology with essential components such as the ESP8266 microcontroller, GPS, GSM module, buzzer, and panic button, the system provides a real-time emergency response mechanism. It ensures that a woman in distress can instantly alert her trusted contacts and authorities while simultaneously sharing her live location. The device is compact, user-friendly, and can be worn or carried easily, making it suitable for everyday use. This project not only highlights the potential of IoT in personal security but also emphasizes how technology can be leveraged for social good. The system can be further enhanced in the future with features like live audio streaming, camera integration, mobile app connectivity, and cloud data storage. Ultimately, this research contributes to building a safer environment and empowering women with the confidence to navigate the world securely.

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